Dr. Kesete Ghebreyesus
Chair and Associate Professor, Department of Chemistry and Biochemistry
Hampton University, Hampton, VA 23668
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Education:

B.S. Chemistry, University of Asmara, Asmara, Eritrea, 1993

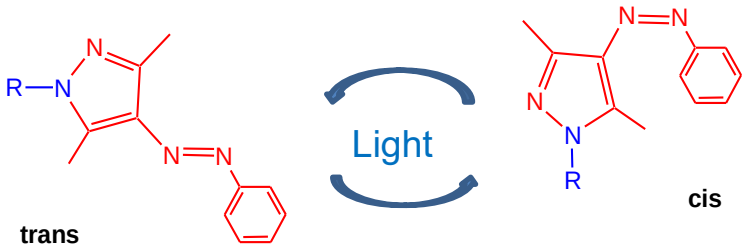
M.S. Inorganic Chemistry and Catalysis, Clark Atlanta University, 1998

Ph.D. Inorganic Chemistry, University of Nevada-Reno, 2003

Postdoctoral Research Associate, Iowa State University, 2003-2005

Research Interests

Our research focuses on the design and synthesis of novel photo-responsive hybrid organic-inorganic materials. We use tunable arylazopyrazole based molecular switches to synthesize photo-switchable materials for application in switchable catalysis, soft nanoscale materials development, photo-pharmacology, and solar energy storage. The ongoing research activities are inspired by using light to achieve desired structure-function relationships of the photoactive materials.



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Toward this end, current research activities comprise three-interrelated concepts:

- **photo-responsive supramolecular soft materials and photomechanical actuators**
- **Hybrid organic-inorganic materials for catalytic and biological applications**
- **Nanomaterials synthesis and characterization**

Professional Experiences

- 2023-present Chair and Associate Professor, Hampton University, Department of Chemistry and Biochemistry
- 2005 – 2017 Assistant Professor, Hampton University, Department of Chemistry and Biochemistry

- 2003 – 2005 Postdoctoral Research Associate, Iowa State University
- 1998 – 2003 Research/teaching assistant, University of Nevada-Reno
- 1996 – 1998 Research/teaching assistant, Clark Atlanta University

Teaching Experiences

- Associate Professor: 2018-present Hampton University Department of Chemistry and Biochemistry
- Assistant Professor: 2005-2017 Hampton University Department of Chemistry and Biochemistry
- Instructor: undergraduate general chemistry for science majors Iowa State University Ames, IA Fall term 2004
- 1998-2003: Teaching assistant, introductory general chemistry and advanced inorganic chemistry lab courses, University of Nevada-Reno, NV.
- 1996-1998: Teaching assistant, introductory general chemistry lab courses**, Clark Atlanta** University, Atlanta, GA.

Professional Societies

- American Chemical Society (2000 – present)
- American Chemical Society Inorganic Division (2000-present)
- American Chemical Society Hampton roads local section (2005-present)

Honors and Awards

- 2016-2017 Nomination for the Edward L. Hamm Jr. distinguished teaching award Hampton University
- Outstanding performance on graduate research award Department of Chemistry, University of Nevada-Reno (2003)
- Special recognition and award for participating in a student poster competition, US department of Energy (1998)

External Funding

- Granting Agency: National Science Foundation (NSF)
- Targeted Infusing Project: Integrating Chemistry Research with Analytical and Forensic Chemistry Education to Enhance Undergraduate Research, Pedagogy, and Workforce Development
- PI: Kesete Ghebreyessus; Amount: $399,940.00; Time period: Sept 2025- Aug 2028
- Granting Agency: National Science Foundation (NSF)
  Title: Major Instrumentation-Single Crystal X-ray Diffractometer for research and Education at an HBCU
  Co-PI: Kesete Ghebreyessus; Amount: $349,989.00; Time period: Sept 2021- Aug 2024
- Granting Agency: National Science Foundation
  Title: Hampton-Brandeis Partnership for Research and Education in Materials (PREM-NSF)
  Co-PI: Kesete Ghebreyessus Amount: $3.6 mil; Time period: Sept 2018- Aug 2024
- Granting Agency: Army Research Office (ARO)
  Title: Inorganic perovskite materials for optoelectronic applications
  Co-PI: Kesete Ghebreyessus; Amount: $600,000; Time period: Sept 2018- Aug 2022

- Granting Agency: National Science Foundation (NSF)
  Title: Hampton-Brandeis Partnership for Research and Education in Materials (PREM)
  Thrust II Lead: Kesete Ghebreyessus
  Amount: $1.26 mil; Time period: Sept 2015- Aug 2018
- Granting Agency: Army Research Office (ARO)-Major Instrumentation Title: Purchase of Microwave Reactors for Implementation of Small-scale Microwave-accelerated Organic Chemistry Laboratory Program in Undergraduate Curriculum and Synthetic Chemistry Research at HU
  Co-PI: Kesete Ghebreyessus; Amount: $223,376; Time period: Sept 2014- Aug 2016
- Granting Agency: Hampton University Faculty Research Fund Title: Photo-switchable Metal-based Anticancer Agents
  PI: Kesete Ghebreyessus; Amount: $5000, Time period: Sept 2013- Aug 2015
- Granting Agency: National Science Foundation (NSF)-Major Research Instrumentation
  Title: Purchase of 400 MHz Magnetic Resonance Instrument for Teaching and Research at HU
  Co-PI: Kesete Ghebreyessus; Amount: $308, 800.00; Time period: Sept 2007- Aug 2010
- Granting Agency: National Science Foundation (NSF)
  Title: Center of Research Excellence in Science and Technology (CREST)
- Senior Personnel: Kesete Ghebreyessus
  Amount: $10.0 mil; Time period: Sept 2006- Aug 2011
- Granting Agency: American Chemical Society Scholars Program Title: Undergraduate student scholarship; Amount: $30,000; time 2017-2020
- Granting Agency: United Negro College Fund (UNCF) Title: Undergraduate student scholarship; Amount: $25,000; time 2010-2012

Publications

1. Roback, C. J.; Minnis M. B.; Ghebreyessus, K.; Ryan C. Hayward, C. R. "Visible Light-Triggered Microactuators and Dynamic Surfaces from 2 Hydrogels Containing Photoswitchable Host−Guest Complexes" *ACS Appl. Polym. Mater.* 2024, 6, 6627–6634. **https://doi.org/10.1021/acsapm.4c00917.**
2. Geter, J.; Ghebreyessus, K. "Lanthanide-Metal Ion Triggered Supramolecular Gelation of Visible-Light-Switchable Amino Acid Functionalized Arylazopyrazole Ligands" Proceedings of the Virginia Academy of Science, Virginia Journal of Science, 2023, 74, 29. **https://digitalcommons.odu.edu/vjs/vol74/iss1/**
3. Mikayla Browning, M.; Jefferson, A.; Geter, J.; Ghebreyessus, K. "Metal Ion- Induced Formation of Metallogels by Visible-Light-Responsive Phenylalanine- Functionalized Arylazopyrazole Ligands" *Photochem,* 2023, *3*, 427-441. **https://doi.org/10.3390/photochem3040026.**
4. Mirbagheri, G.; Uba, I.; Ghebreyessus, K.; Hommerich, U.; Fraden, S.; Stehnach, M.; Geddis, D.

"Numerical Analysis of the propagation Modes of Photo-switching PDMS-Arylazopyrazole Optical Waveguide and Thin-Film Spectroscopic Characterization" *Proceeding of SPIE-the international society for optical engineering* **2023**, 12424. https://doi.org/10.1117/12.2668000.

5. Mirbagheri, G., Uba, I., Ghebreyessus, K., Hommerrich, U., Fraden, S., Stehnach, M., Geddis, D. "Numerical Analysis of the Propagation Modes of Photoswitching PDMS-Arylazopyrazole Optical Wave-Guide and Thin-Film Spectroscopic Characterization" J. Nanophotonics, **2023**, *17*, 026014-1.**10.1117/1.JNP.17.026014**
6. Uba, I, Geddis, D., Ghebreyessus, K., Hömmerich, U., Dumas, J. "A Study of Wave Confinement and Optical Force in Polydimethlysiloxane–Arylazopyrazole Composite for Photonic Applications" *Polymers*, **2022**, *14*, 896. https://doi.org/10.3390/polym14050896.
7. Ghebreyessus, K.; Ndip, E.; Waddell, M.; Asojo, O.; **Njoki, P. N.*** Cultivating Success through Undergraduate Research Experience in a Historically Black College and University. *Journal of Chemical Education*. **2022**, *99*, 307-316. https://doi.org/10.1021/acs.jchemed.1c00416.
8. Uba, I.; Geddis, D.; Ghebreyessus, K.; Hömmerich, U.; Jerald Dumas, J. "A Study of Wave Confinement and Optical Force in Polydimethlysiloxane– Arylazopyrazole Composite for Photonic Applications" *Polymers,* **2022**,*14*, 896-908. **https://doi.org/10.3390/polym14050896**.
7. Yia, M.; Guoa, J.; Hea, H.; Tana, W.; Harmon, N.; **Ghebreyessus, K**.; Xu, B. "Phosphobisaromatic motifs enable rapid enzymatic self-assembly and hydrogelation of short peptides" *Soft Matter*, **2021**, *17*, 8590-8594. **https://doi.org/10.1039/D1SM01221E.**
8. **Ghebreyessus, K**.; Uba, I.; Geddis, D.; Hommeric, U. Solid-state photoswitching in arylazopyrazole-embedded polydimethylsiloxane composite thin films" *J. Solid State Chem.* **2021**, 303, 122519. https://doi.org/10.1016/j.jssc.2021.122519
9. Uba, I.; **Ghebreyessus, K**.; Geddis, D.; Hommeric, U. "Tunable Optoelectronic Properties of Polydimethylsiloxane-Arylazopyrazole Flexible Composite" *Conference proceeding IEEE SOUTHEASTCON* **2021**, 9401853. **10.1109/SoutheastCon45413.2021.9401853.**
10. Hommeric, U.; Barnett, J.; Kabir, A.; Ghebreyessus, K.; Hampton, K.; Uba, S.; Uba, I.; Geddis, D.; Yang, C.; Trevedi, S. B.; Fraden, S.; Ali Aghvami, S. "Comparative steady-state and time-resolved emission spectroscopy of Mn-doped CsPbCl3 perovskite nanoparticles and bulk single crystals for photic

applications" *Proceeding of SPIE-the international society for optical engineering* **2021**, 11682. https://doi.org/10.1117/12.2582217.

11. Sallee, A.; **Ghebreyessus, K.** "Photoresponsive Zn^{2+}-specific metallohydrogels coassembled from imidazole containing phenylalanine and arylazopyrazole derivatives" Dalton Trans. **2020**, *49*, 10441-10451. https://doi.org/10.1039/D0DT0109K.
12. Sallee, A; Mukooza, I.; **Ghebreyessus, K**. "Photo-responsive Metallogels" Proceedings of the Virginia Academy of Science, May 22-24, 2019.
13. **Ghebreyessus, K**.; Cooper, S. M. Jr. "Photoswitchable Arylazopyrazole-Based Ruthenium(II)-Arene Complexes," *Organometallics,* **2017**, *36*, 3360-3370. https://doi.org/10.1021/acs.organomet.7b00493.
14. **Ghebreyessus, K**.; Almutiri, A. A. "Ruthenium(II)-arene Complexes Conjugated With Photoswtichable N-Heterocyclic Carbene (NHC)-Functionalized Arylazopyrazole Ligands" proceedings of the Virginia Journal of Science, 17-19, 2017.
15. **Ghebreyessus, K.**; Little, J. "Photoswitchable Arylazopyrazole Ligands; Synthesis and coordination Chemistry". Proceedings of the Virginia Journal of Science, 18-20, 2016.
16. **Ghebreyessus, K.**; Peralta, A.; Katdare, M.; Prabhakaran, K.; Paranawithana, S. "Evaluation of Naphthalimide-Tagged Ruthenium(II)-Arene Complexes as Potential Anticancer Agents," proceedings of the Virginia Journal of Science, 21-23, 2015.
17. **Ghebreyessus, K.;** Peralta, A.; Shanthi Paranawithana, S.; Katdare, M., "Ruthenium(II)-Arene Complexes with Naphthalimide-Tagged N, O- and N, N- chelating Ligands: Synthesis and Biological Evaluation" *Inorg. Chim. Acta,* **2015**,*434*, 239-251. https://doi.org/10.1016/j.ica.2015.05.025
18. **Ghebreyessus, K**.; Babu, S. Claville, M., "Rapid Synthesis of Highly Stable Silver Nanoparticles and its Application for Colorimetric Sensing of Cysteine," *J. Expert. Nanoscience,* **2015**,*10*, 1242-1255. https://doi.org/10.1080/17458080.2014.994680.
19. **Ghebreyessus, K. Y.;** Angelici, R. J., "Isomerizing-hydroboration of the monounsaturated fatty acid ester methyl oleate", *Organometallics,* **2006**, *25*, 3040- 3044. https://doi.org/10.1021/om0600947.
20. Ghebreyessus, K. Y.; Schiltz, H.; Angelici, R. J., "Partial Separation of polyunsaturated fatty

acid esters from FAME mixtures by adsorption of silver nitrate-impregnated silica gel", *J. Am. Oil Chem. Soc.,* **2006**, *83*, 645-652. 10.1007/s11746-006-1252-5.

21. **Ghebryessus, K. Y.;** Ellern, A.; Angelici, R. J., "Equilibrium studies of the binding of unsaturated fatty acid methyl esters to palladium (II)", *Organometallics,* **2005**, *24*, 1725-1736. https://doi.org/10.1021/om049009q.

22. Ingram, C. W.; **Ghebreyessus, K. Y.,** "Catalytic and selective behavior of MeAPO-36 in the mild hydrocracking of heavy gas oil", *Per. Am. Chem. Soc., Pet. Div.,* **2004**, *49*, 92-97.

23. **Ghebreyessus, K. Y.;** Nelson, J. H., "Enantioselective Synthesis pure P-chiral (η^6-arene) ruthenium(II) complexes using enantiomerically pure ortho-metallated palladium(II) amine complexes", *Organometallics*, **2003**, *22*, 2977-2980. https://doi.org/10.1021/om030172f

24. **Ghebreyessus, K. Y.;** Nelson, J. H. "Conformationally rigid arene-ruthenium(II) complexes as catalyst for the transfer hydrogenation of ketones", *J. Organomet. Chem.,* **2003**, *669*, 48-56. https://doi.org/10.1016/S0022-328X(02)02216-7.

25. **Ghebreyessus, K. Y.;** Nelson, J. H., "Reactions of [(η^6-Me_6C_6)$RuCl_2$($Ph_2PCH=CH_2$)] with 1-ethynylcycloalkanols leading to methoxy-alkenyl carbenes via vinylvinylidene and allenylidene intermediates", *Inorg. Commun.,* **2003**, *6*, 1044-1047. https://doi.org/10.1016/S1387-7003(03)00177-1.

26. **Ghebreyessus, K. Y.;** Nelson, J. H., "(η^6-arene)ruthenium(II) complexes with hemilabile □^{3}-dicyclohexylvinylphosphine (DCVP) and η^3-diphenylvinyl phosphine (DPVP) phosphaallyl ligands: Formation of an expected trinuclear complex", *Synth. React. Inorg. Met.-Org. Chem.,* **2003**, *33*, 1329-1349. https://doi.org/10.1081/SIM-120024313.

27. **Ghebreyessus, K. Y.;** Nelson, J. H., "Carbene and isocyanide ligation at ruthenium(II) with tethered phosphinopropylarene ligands", *Inorg. Chim. Acta*, **2003**,*350*, 12-24. https://doi.org/10.1016/S0020-1693(02)01492-5.

28. **Ghebreyessus, K. Y.;** Nelson, J. H., "Synthesis and characterization of tethered arsinopropylarene-ruthenium(II) complexes", *Organometallics,* **2002**, *21*, 1727- 1733.

https://doi.org/10.1021/om011092j.

29. **Ghebreyessus, K.Y.;** Nelson, J.H. “Base promoted hydroalkylations reactions of mesitylene, cymene, durene, hexamethylbenzene, paraxylene, and toluene ligands coordinated to ruthenium(II)”, *Organometallics*, **2000**,*19*, 3387. https://doi.org/10.1021/om000375t.

Book Chapters

- *Cooper, S. M.; Ha, D.; Candace Snow-Davis, C.; Watson, N.; Raymond E. Samuel, R. E.;* ***Ghebreyessus****,* ***K.****; Du, C.; Huang, Y.; Li, F. “Stimuli- Responsive Nanomedicine”, Book chapter,* ***2021*** *page 44.* eBook ISBN9780429295294.